ATENT COOPERATION TRE. .Y

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 07 December 1999 (07.12.99)	
International application No. PCT/US99/07389	**Applicant's or agent's file reference** GREEn-1 PCT
International filing date (day/month/year) 23 April 1999 (23.04.99)	**Priority date** (day/month/year) 23 April 1998 (23.04.98)
Applicant GREEN, Paul, Eliot, Jr.	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

15 November 1999 (15.11.99)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Kiwa Mpay
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

16

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
GREEN-1 PCT		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US99/07389	23/04/1999	23/04/1998
International Patent Classification (IPC) or national classification and IPC H04B10/00		
Applicant TELLABS OPERATIONS, INC. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
15/11/1999	28.06.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Sinapius, G Telephone No. +49 89 2399 8170

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/07389

I. Basis of th report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-11 as originally filed

Claims, No.:

1-38 as originally filed

Drawings, sheets:

1/3-3/3 as originally filed

2. The amendments have resulted in the cancellation of:

☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2, 3, 5-37
	No:	Claims	1, 4, 38
Inventive step (IS)	Yes:	Claims	
	No:	Claims	2, 3, 5-37
Industrial applicability (IA)	Yes:	Claims	1-38
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Reference is made to the following documents:

D1: US-A-4 938 571
D2: EP-A-0 766 358
D3: US-A-5 657 151
D4: WO 95 20847 A
D5: FR-A-2 523 734

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. In view of sect. VII.1. below **claims 1, 9 and 19** are treated as claims dependent on claim 38.

2. Novelty:

a. Document D1 (cf. especially column 4, line 22 - column 6, line 22; column 6, lines 57-66; column 7, lines 8-14 and figs. 1 and 3) is regarded as being the closest prior art to the subject-matter of **claim 38**, and shows (the reference in parentheses applying to fig. 1 of this document):

a method for processing an optical signal in a communication link, comprising the steps of
establishing a propagation path along which the optical signal travels;
providing an electrochromic region (18) to intersect the propagation path; and
attenuating the optical signal by passing the signal through the electrochromic region.

The subject-matter of **claim 38** is therefore not novel (Article 33(2) PCT).

b. Dependent **claims 1 and 4** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty, the reasons being as follows:
claim 1: cf. sect. a. above;

claim 4: cf. the electrodes 12 and 12' in fig. 1 of D1.

3. Inventive step:

a. Document D1 is also regarded as being the closest prior art to the subject-matter of **claims 28 and 37**.

b. D1 discloses an attenuating device (suitable) for use in processing an optical signal in a communication link from which the subject-matter of **claim 28** only differs in that it comprises:
(i) first and second graded index lenses disposed to establish a propagation path for an optical communication signal intermediate which the body of electrochromic material is disposed.

c. D1 discloses a device (suitable) for attenuating an optical telecommunications signal from which the subject-matter of **claim 37** seems to differ in that:
(ii) it comprises a first waveguide to receive an optical signal that represents a digital telecommunications signal and a second waveguide disposed to cooperate with the first waveguide to establish a propagation path for the received optical signal through the first and second waveguide intermediate which the body of electrochromic material is disposed, and
(iii) an incident planar surface of the electrochromic device is substantially perpendicular to the propagation path of the optical signal.

d. Document D1 relates to the technical features an electrochromic light modulator as such and mentions the modulation of optical frequency carriers as one possible application. D1 not give details about how the modulator is linked to the optical signal. When incorporating the modulator in a communications link, the skilled person would as matter of course refer to commonly employed techniques. He would thus be guided by D3 (cf. especially column 5, line 32 - column 6, line 8 and fig. 3) to include the above features (i) and/or (ii) in the device of D1.

e. The feature (iii) is, if not already implicitly disclosed by column 4, lines 21-25 and fig. 1 of D1, at most a matter of common practice, see for example fig. 1 of document D5. Its application to the device described in document D1 is therefore

an obvious design possibility for the skilled person.

f. Therefore the solution proposed in independent **claims 28 and 37** of the present application cannot be considered as involving an inventive step (Article 33(3) PCT).

g. Dependent **claims 2, 3, 5-27 and 29-36** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step. These claims essentially relate to different combinations of the following three features: the electrochromic body, the WDM (de)multiplexers and the graded index lenses. Since these well known features are advantageous independently of each other, their combination is a mere juxtaposition:
claims 2, 3, 10, 11, 19, 32-34: cf. fig. 3 of D2;
claim 5, 14, 15, 22-24: cf. the lenses 304 and 305 in fig. 3 of D3;
claims 6, 8, 17, 18, 26, 27, 35, 36: page 12, lines 22-29 and fig. 1 of D4;
claim 7: cf. fig. 3 of D1;
claim 9: cf. sect. e. above and column 6, lines 14-22 and fig. 3 of D1;
claim 12, 13, 21, 29: cf. the electrodes 12 and 12' in fig. 1 of D1;
claims 16, 25: cf. the electrodes 12 and 12' in fig. 1 of D1 and the lenses 304 and 305 in fig. 3 of D3;
claims 20, 31: cf. sect. e. above;
claim 30: cf. the fiber optic cables 310, 312 and the lenses 304, 305 in fig. 3 of D3.

Re Item VII
Certain defects in the international application

1. **Claims 1, 9, and 19** comprise all the features of claim 38 and are therefore not appropriately formulated as claims dependent on the latter (Rule 6.4 PCT).

2. The independent claims are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in a preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in a

characterising part (Rule 6.3(b)(ii) PCT).

In the present case, the features indicated in sects. V.2.a., V.3.b. and V.3.c. above are known in combination from the document D1 and belong in the preamble of such claims.

The applicant has not provided reasons why the independent claims should not be in the two-part form. Neither did he clearly indicate in the description which features of the subject-matter of the independent claims are already known from document D1; see the PCT Guidelines, III-2.3a.

3. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

4. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 - D3 is not mentioned in the description, nor are these documents identified therein.

Re Item VIII

Certain observations on the international application

1. The following passages and features are not clear:
   claims 35 and 35: these claims do not seem to relate to the claimed device but to its use;
   it seems that **claim 37** (page 21, lines 8 and 9) should read "... variable **voltage** source", cf. page 6, line 13 of the description.

2. The vague and imprecise statement "**true spirit** ... of the invention" in the description on page 11 implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them (see also the PCT Guidelines, III-4.3a).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
GREEN-1 PCT		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US 99/ 07389	23/04/1999	23/04/1998
Applicant		
TELLABS OPERATIONS, INC. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established by this Authority to read as follows:

   METHODS AND APPARATUS FOR SELECTIVE ATTENUATION IN AN OPTICAL COMMUNICATION USING ELECTROCHROMIC MATERIAL

5. With regard to the **abstract,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 6

   [ ] as suggested by the applicant.

   [X] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/07389

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04B10/00 G02F1/15

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04B G02F H04J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 4 938 571 A (COGAN STUART F ET AL) 3 July 1990 (1990-07-03) column 2, line 19 - line 61 column 4, line 22 - line 51 column 7, line 1 - line 14 figure 1	1,4,9, 12,13,38 2,3,5-8, 10,11, 14-21, 26-31,37
Y A	EP 0 766 358 A (SIEMENS AG) 2 April 1997 (1997-04-02) column 4, line 56 - column 5, line 9; figure 3	2,3,10, 11,19-21 32-35

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 July 1999	26/07/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Cochet, B

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Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 95 20847 A (BARNSLEY PETER EDWARD ;MCGUIRE ALAN (GB); BRITISH TELECOMM (GB); H) 3 August 1995 (1995-08-03)	6-8,17, 18,26,27
A	page 10, line 22 - line 29 page 14, line 1 - line 13 figures 1,2B	2,3,10, 11, 19-21, 26,32-36
Y	US 5 657 151 A (SWAN CLARENCE B ET AL) 12 August 1997 (1997-08-12)	5,14-16, 28-31,37
A	column 5, line 30 - line 64; figure 3	22-25
A	FR 2 523 734 A (COMMISSARIAT ENERGIE ATOMIQUE) 23 September 1983 (1983-09-23) page 1, line 18 - line 34 page 5, line 35 - page 6, line 6 figures 1,2	1,20,31, 37

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 99/07389

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4938571 A	03-07-1990	CA 1308800 A	13-10-1992
		EP 0379562 A	01-08-1990
		JP 3500096 T	10-01-1991
		WO 8912844 A	28-12-1989
		US RE34469 E	07-12-1993
EP 0766358 A	02-04-1997	DE 19536231 A	10-04-1997
WO 9520847 A	03-08-1995	AU 696430 B	10-09-1998
		AU 1463395 A	15-08-1995
		CA 2181811 A	03-08-1995
		CA 2239913 A	03-08-1995
		EP 0741934 A	13-11-1996
		JP 7212347 A	11-08-1995
		US 5600466 A	04-02-1997
		US 5864414 A	26-01-1999
US 5657151 A	12-08-1997	GB 2284677 A	14-06-1995
		JP 7199137 A	04-08-1995
FR 2523734 A	23-09-1983	NONE	

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04B 10/00, G02F 1/15

A1

(11) International Publication Number: **WO 99/55023**

(43) International Publication Date: 28 October 1999 (28.10.99)

(21) International Application Number: PCT/US99/07389

(22) International Filing Date: 23 April 1999 (23.04.99)

(30) Priority Data:
09/065,250 23 April 1998 (23.04.98) US

(71) Applicant *(for all designated States except US)*: TELLABS OPERATIONS, INC. [US/US]; 4951 Indiana Avenue, MS 16, Lisle, IL 60532 (US).

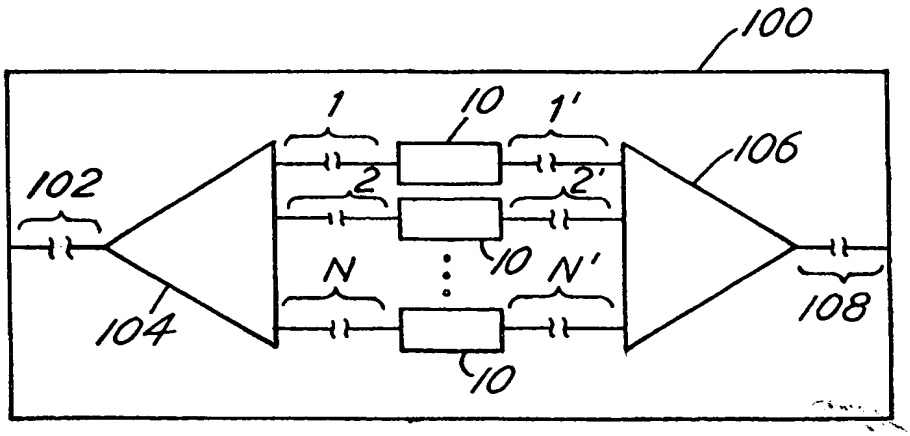
(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: GREEN, Paul, Eliot, Jr. [US/US]; 35 Roseholm Place, Mount Kisco, NY 10549 (US).

(74) Agent: RUDOFSKI, Kenneth, J.; Tellabs Operations, Inc., 4951 Indiana Avenue, MS 16, Lisle, IL 60532 (US).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: METHODS AND APPARATUS FOR SELECTIVE ATTENUATION IN AN OPTICAL COMMUNICATION USING ELECTROCHROMIC MATERIAL



(57) Abstract

Disclosed methods and apparatus for processing optical signals in a communications network to adjust or reset the power level of a signal employ a body of electrochromic material disposed along an optical communication signal propagation path. An optical communication signal travelling along the propagation path is attenuated using the body of electrochromic material. The body preferably is switchable between at least two color states through selective application of a voltage potential in such a way as to affect the body, producing each of the at least two color states permitting at least attenuated passage through the body of the optical communication signal. Applications for the present invention include, for example, the selective attenuation of constituent WDM optical communication signals through the use of multiplexers and/or demultiplexers.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

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EE	Estonia	**LR**	Liberia	**SG**	Singapore		

INTERNATIONAL SEARCH REPORT

Interr. nal Application No
PCT/US 99/07389

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04B10/00 G02F1/15

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04B G02F H04J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 4 938 571 A (COGAN STUART F ET AL) 3 July 1990 (1990-07-03) column 2, line 19 - line 61 column 4, line 22 - line 51 column 7, line 1 - line 14 figure 1	1,4,9, 12,13,38 2,3,5-8, 10,11, 14-21, 26-31,37
Y A	EP 0 766 358 A (SIEMENS AG) 2 April 1997 (1997-04-02) column 4, line 56 - column 5, line 9; figure 3	2,3,10, 11,19-21 32-35

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 July 1999	26/07/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Cochet, B

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Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 95 20847 A (BARNSLEY PETER EDWARD ;MCGUIRE ALAN (GB); BRITISH TELECOMM (GB); H) 3 August 1995 (1995-08-03)	6-8,17, 18,26,27
A	page 10, line 22 - line 29 page 14, line 1 - line 13 figures 1,2B	2,3,10, 11, 19-21, 26,32-36
Y	US 5 657 151 A (SWAN CLARENCE B ET AL) 12 August 1997 (1997-08-12)	5,14-16, 28-31,37
A	column 5, line 30 - line 64; figure 3	22-25
A	FR 2 523 734 A (COMMISSARIAT ENERGIE ATOMIQUE) 23 September 1983 (1983-09-23) page 1, line 18 - line 34 page 5, line 35 - page 6, line 6 figures 1,2	1,20,31, 37

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 99/07389

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4938571 A	03-07-1990	CA 1308800 A	13-10-1992
		EP 0379562 A	01-08-1990
		JP 3500096 T	10-01-1991
		WO 8912844 A	28-12-1989
		US RE34469 E	07-12-1993
EP 0766358 A	02-04-1997	DE 19536231 A	10-04-1997
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